

# An Ultra Simple Ultra Fine Feed for a RF30 Mill/Drill

*Version 2*

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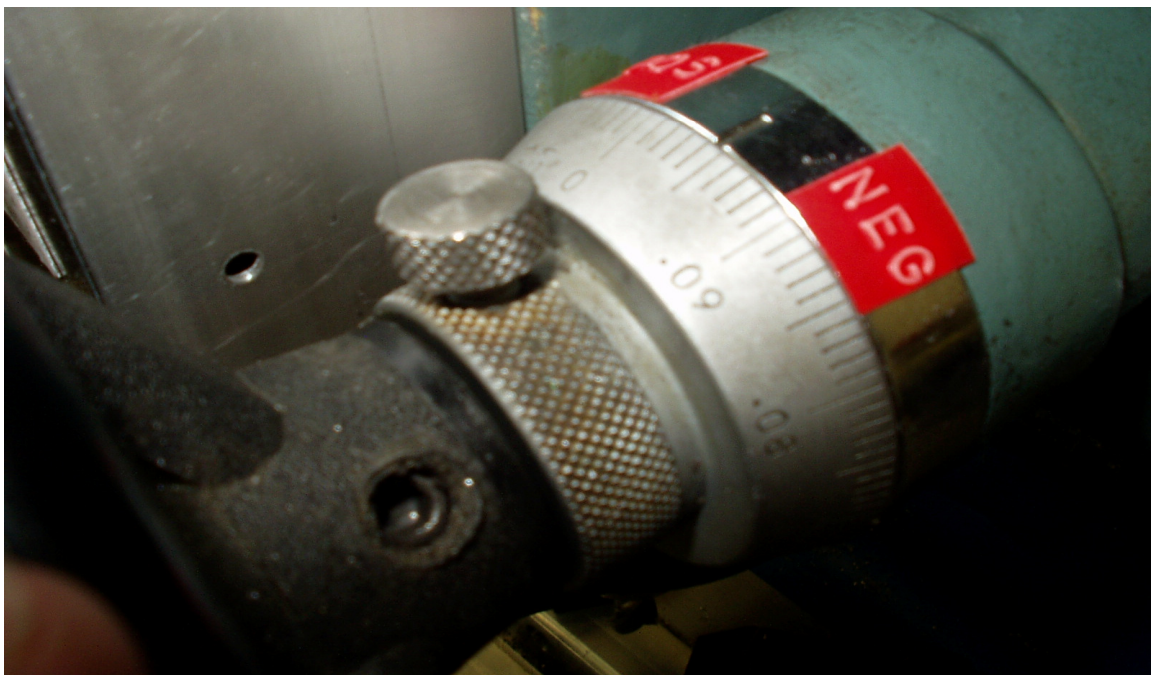
*July 3, 2007*

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## *Introduction*

Lately I have been pushing my mill/drill's accuracy and repeatability just to learn what it can do. An essential step in this effort has been to find a way to move the quill by very small amounts in a smooth and controlled fashion. It is not a precision movement but rather one that is easy to control. Other means, like a dial test indicator or a Digital Read Out are needed to measure the actual movement. With this ultra fine feed I am able to set my DTI right on zero with little effort.

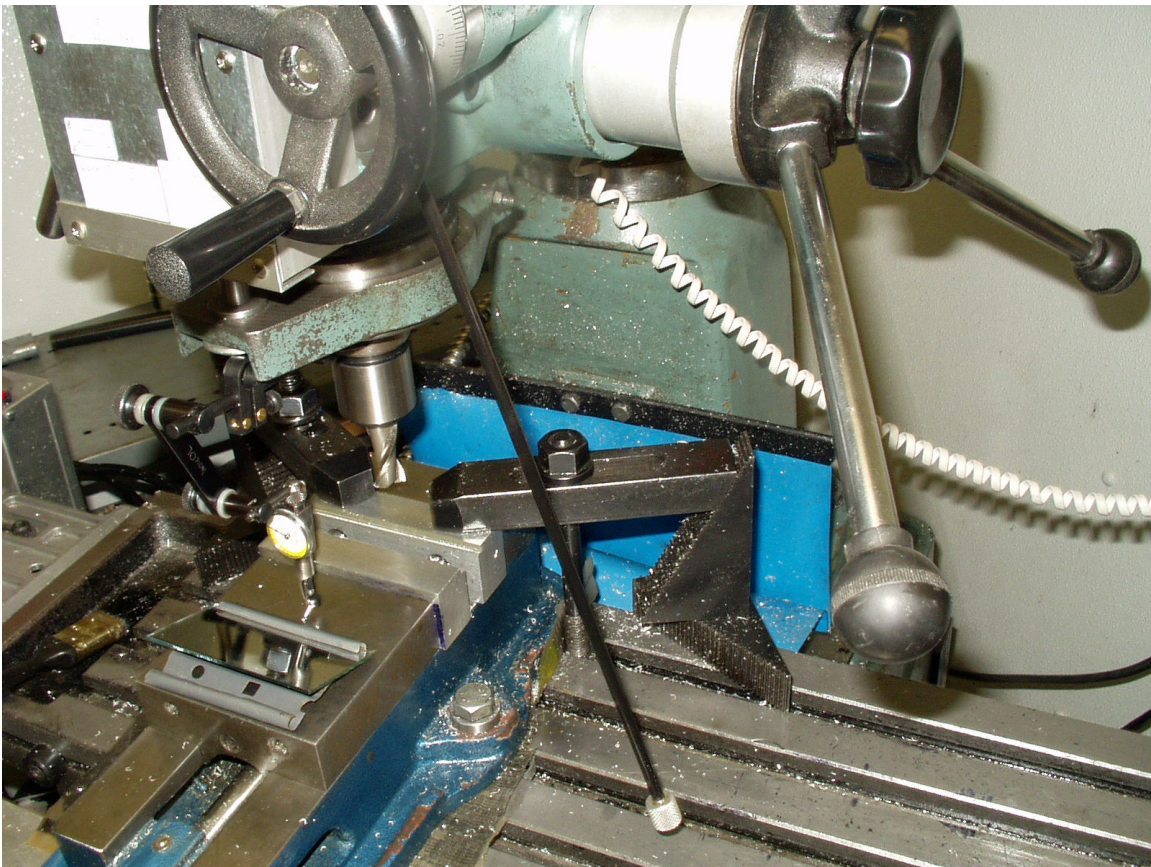
## *The Starting Point*



My downfeed handwheel has a graduated dial on the same shaft which can be locked in place as needed via a set screw. One full rotation causes the quill to move almost exactly 0.100". How accurately I can set a given position really depends on how well I can creep my fingers along the circumference of the handwheel.

The circumference of a circle equals about 3.1 times its diameter. If my handwheel has a diameter of 3.2", then the circumference will be about 10". One rotation causes a change in quill position of 0.100" so I can say that as I creep 10" around the handwheel's circumference, I will move the quill about 0.100". This comes out to  $(0.100"/10" =) 0.01"$  of quill movement for each 1" of handwheel circumference.

So how do I get a finer feed? I could make the handwheel larger but would quickly find it in my way. But do I really need the entire handwheel to be bigger? Not really. I just need a single point on the circumference to be bigger. I can do that with just a length of 1/4" diameter rod.



I have removed the set screw from the graduated collar and screwed in a rod. At the end of the rod is a scrap knob which makes it easier to lock the graduated collar to the downfeed shaft. The bottom of the rod just clears the lip of my vise base. By far, the hardest part of this construction was putting a coat of black paint on the rod to make it look nice. When not in use, I unscrew the rod and put it aside.

The distance from the center of the handwheel to the end of the rod's knob is 13 1/2". Plug this into the approximate formula for circumference and we get  $(3.1 \times 13.5" =) 82"$ . By creeping 82" around the circumference of a circle defined by the end of this rod, we move the quill 0.100". This can't really be done because the rod would quickly hit something. Doesn't matter, this is a fine feed so we are only going to move it a few thou.

So 82" is about one revolution of the handwheel and a quill movement of 0.100". This means that a quill movement of 0.0001" is approximately achieved by swinging the end of the rod 0.082". I have found it rather easy to make a 0.08" movement, especially if my hand is resting on the mill's table. By watching the DTI or the DRO, you should be able to coordinate your hand movement to set whatever value you want.

### *Detailed Plans for the Ultra Fine Feed*



Find a length of scrap 1/4" rod, hopefully with one end already threaded to match the set screw. Mine is 1/4-20. If necessary, cut the rod so the bottom clears at least the mill table. Then find a knob for the other end. If you really want to go crazy, paint the rod. That's about it.

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